Original Article

Opioid Prescription after Common Urgency General Surgery Procedures: An International Perspective

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Objective: There are no guidelines for adequate postoperative pain control while lowering the risk of morphine overuse. To optimize the utilization of morphine derivatives, the proportions of patients and morphine amounts prescribed postoperatively have been studied worldwide. The present study reviewed the number of patients receiving morphine and the amounts administered at the Department of Acute Care Surgery.

Materials and Methods: The use of postoperative oral morphine derivatives by patients undergoing common emergency general surgeries was retrospectively reviewed. Electronic data were collected of patients undergoing open appendectomy, laparoscopic appendectomy, laparoscopic cholecystectomy, open cholecystectomy, and open hernia surgery. The rates and amounts of the morphine derivatives prescribed during hospitalization and at discharge were analyzed. The amounts of the derivatives were converted to morphine milligram equivalents (MME).

Results: Opioid derivatives were prescribed postoperatively for 22 patients (3.8%), with an average of 2.4 MME. Eighteen patients (3.1%) received intrahospital morphine derivatives (mean: 30 MME), while thirteen (2.2%) obtained them as a home medication (mean: 67 MME). The overall length of stay was 3.2 days (1 to 33), and the mean last pain score was 0.5 (0 to 7). A multiple logistic regression revealed that patients aged ≤60 years and with a BMI <25 had a higher proportion of morphine prescriptions.

Conclusion: On case-by-case adjustments, a trivial amount of morphine derivatives was sufficiently prescribed to deal with postoperative pain following common general emergencies. The proportions of morphine prescriptions were higher among younger patients and those with average BMIs.

Keywords: Postoperative opioids, Urgency surgery, Opioids prescriptions

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Without developed guidelines for acute pain management, there are variations in postoperative pain practices. In addition to the influences of the types of operation, patient factors, and the unpredictability of pain itself, there is an inconsistent prescribing of morphine derivatives by medical personnel. A morphine overdose causes a compromise in the respiratory system, such as apneas, while the adverse effects of inadequate pain control may contribute to chronic pain[(1)] or impact the quality of life in the long term[(2)]. Moreover, excessive prescriptions are related to rising levels of addiction to morphine substances[(3,4)]. In the past twenty years, the over-utilization of morphine derivatives has led to increased incidences of morphine-related deaths, especially in North America[(5)]. These problems have been attributed to the absence of definite guidelines for acute postoperative pain management.

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There has been a growing incidence of chronic opioid usage by opioid-naive patients undergoing general surgical procedures[(6)]. Although there is a low incidence (less than 0.5%) in emergency operations, there are large numbers of patients encountering these operations with diverse risks e.g., open cholecystectomy (OC; OR, 3.60; 95% CI, 2.80 to 4.62; $p<0.001$), laparoscopic cholecystectomy (LC; OR, 1.62; 95% CI, 1.49 to 1.76; $p<0.001$), and open appendectomy (OA; OR, 1.69; 95% CI, 1.24 to 2.31; $p = 0.001$).

To compare data relating to the usage of optimized morphine derivatives in various regions, the proportion of morphine-prescribed populations and their dosing regimens were gathered internationally. Our aim was to lower the risks of having excessive prescriptions while maintaining the adequacy of postoperative pain control. This is a retrospective study of the use of postoperative morphine derivatives for five general emergencies: OA, laparoscopic appendectomy (LA), LC, OC, and open inguinal hernia repair (OH).

Materials and Methods

Electronic data of patients admitted into the authors' department at Siriraj Hospital, a large teaching

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hospital in Thailand, were collected retrospectively. The patients who were enrolled for the present study were aged fifteen years or older and had one of three emergency conditions (acute appendicitis, acute cholecystitis, or incarcerated inguinal hernia) during the three calendar years from 1 January 2016. All patients underwent emergency procedures for their conditions (OA, LA, OC, LC, and OH, as appropriate), except in the case of those who needed an exploratory laparotomy. Excluded from the study were patients with chronic pain and a history of either opioid use or the regular use of analgesics. In addition, mentally retarded patients and those with sensory deficits were excluded. Demographic data, intraoperative details, and data of their postoperative courses (including analgesics and complications such as surgical site infections) were collected by means of a case-record form. Additionally, data relating to thirty-day readmissions and reoperations were gathered. Analgesic data were retrieved from the hospital's pharmacologic database and the nurse record forms held in wards.

The proportion of patients receiving postoperative opioids was determined. These postoperative opioids were subsequently subdivided into intrahospital and take-home medications. The amounts of opioid used by each group were calculated in a common unit, morphine milligram equivalents (MME). The various dosages of opioids were also modified into MME by the variants for each derivative. For example, the doses of Tramol and Tramadol were multiplied by 0.1, while that of Codeine was multiplied by 0.15. Furthermore, patient factors that affected the postoperative opioid requirement were investigated, e.g., age, gender, BMI, procedure, intraoperative adverse events, complications, pain score at discharge, and length of stay (LOS).

Results

Over the three-year study period, 579 patients received urgent operations: 466 in the OA group, 40 in the LC group, 29 in the OH group, 26 in the LA group, and 18 in the OC group (Table 1). The average age of the patients was 42 years, 45.9% were males, and their mean BMI was 23.7. Most patients (99.3%) received general anesthesia, while the remainder were operated under regional anesthesia. The incidence of the intraoperative adverse events was 14.5% and of the intensive care unit admissions was 1.6%. The reoperation and readmission rates were 0.3% and 0.5%, respectively. Almost all of the patients (98.1%) were provided with non-opioid analgesics, with 97.2% receiving acetaminophen, 9.2% given Cox-II inhibitors, and 8.6% administered other NSAIDs. The overall average pain score at the time of discharge was 0.5 (0 to 7). The pain scores were highest in the OA group (0.6) and lowest in the LA and OH groups (0.3), with the LC and OC groups having the same pain score level (0.4). The overall total LOS was 3.2 days (1 to 33). The mean LOS for the OA, LA, and OH groups were similar at 2.8, 3.0, and 3.3 days, respectively. In contrast, the mean LOS for the LC and OC groups was 5.1 and 8.4 days, respectively.

Overall, oral opioids were prescribed to 22 patients (3.8%). Tramadol and Tramol accounted for almost all (91%) of the morphine derivatives, and they were prescribed at the dosage of one 50 milligram tablet three times a day (every eight hours), or whenever pain was experienced. Eighteen patients (3.1%) received the medications while hospitalized, and thirteen patients (2.2%) obtained them upon discharge. Opioid administration was highest for the OC group (16.7%), followed by LA (7.7%), OH (6.9%), LC (5%), and OA (2.8%); however, there were no statistically significant

Table 1. Demographic data, hospital courses, and proportion of opioids prescribed to patients

	Overall	OH	LA	LC	OA	OC
Sex						
Male	45.9%	93.1%	15.4%	35.0%	44.4%	77.8%
Female	54.1%	6.9%	84.6%	65.0%	55.6%	22.2%
Age (years)	42.1	59.0	42.5	57.3	38.8	64.9
BMI	23.7	22.8	23.5	26.4	23.4	26.4
General anesthesia	99.3%	89.7%	100%	100%	99.8%	100%
Intraoperative adverse events	14.5%	13.8%	11.5%	7.5%	13.5%	61.1%
Complications	11.6%	3.5%	7.7%	15.0%	11.2%	33.3%
LOS (range)	3.2 (1 to 33)	3.3 (1 to 10)	3.0 (1 to 10)	5.1 (2 to 16)	2.8 (1 to 15)	8.4 (3 to 33)
ICU admission	1.6%	0.0%	0.0%	2.5%	1.1%	16.7%
Readmission	0.5%	0.0%	0.0%	0.0%	0.6%	0.0%
Reoperation	0.3%	0.0%	0.0%	0.0%	0.2%	5.6%
Pain value before discharge (range)	0.5 (0 to 7)	0.3 (0 to 3)	0.3 (0 to 2)	0.4 (0 to 4)	0.6 (0 to 7)	0.4 (0 to 2)
Opioid analgesics	3.8%	6.9%	7.7%	5.0%	2.8%	16.7%
Non-opioid analgesics	98.1%	100%	96.2%	100%	98.1%	99.4%
Intrahospital opioids (MME)	25	15	18.4	17.5	27	28
Take-home opioids (MME)	39	25	0	50	40	67

OH = Open hernia, LA = Laparoscopic appendectomy, LC = Laparoscopic cholecystectomy, OA = Open appendectomy, OC = Open cholecystectomy

differences between the groups. A multivariable logistic regression analysis found differences in the prescribing of opioids among certain subgroups (Figure 1). Both during the intrahospital period and the discharge phase, postoperative opioids were ordered less frequently for patients older than 60 (adjusted OR = 0.313, p = 0.028; and adjusted OR = 0.241, p = 0.018, respectively) and for patients with a BMI >25 (adjusted OR = 0.338, p = 0.032; and adjusted OR = 0.299, p = 0.039, respectively).

The average amount of overall postoperative morphine dispensed was 2.4 MME per case; its utilization within the ward was 0.9 MME per case, whereas as a take-home medication, it was 1.5 MME per case. In the case of opioid recipients, the median amounts of opioids dispensed within the ward and for home use were 30 MME (5 to 120 MME) and 67 MME (19 to 100 MME) per case, respectively. In terms of the type of operation, the average opioid dosages were the highest for the OC group, both during the early postoperative period and at discharge (1.5 MME and 3.7 MME). The OC group dosages were followed by the LC group (0.4 MME and 1.3 MME), OH group (0.5 MME and 0.9 MME), LA group (0.7 MME and 0 MME), and OA group (0.1 MME and 0.1 MME).

Discussion

Almost every patient received non-opioids as a postoperative analgesic, but 22 out of the 579 patients in the study cohort were administered oral opioids to relieve their pain after surgery. The very small ratio of prescribed opioids decreased the median volume of opioids to 2.4 MME per case. This overall value does not reflect the hazards of overusing opioids, which was the intention of the present study. The average individual dose in the only-opioid-receiving group was 32 MME, with a maximum amount of 130 MME (Figure 2). Despite the lack of guidelines for opioid use for acute pain management, especially during the postoperative period, CDC 2016[7] recommends that less than 90 MME be used for chronic pain and that opioids be used for no longer than 7 days for acute pain. Only 9 out of the 22 cases (1.6%) in the current study were given opioids both within the hospital and later for their home use. The home medications were mainly 50 milligrams of Tramadol, taken three times a day, with an average of 69 MME per case. Given that the median LOS was 3 days, these patients' intrahospital and take-home opioids combined would not have exceeded a one-week period.

The rare use of intrahospital opioids (3.1%) in the present study resulted in a minuscule average dose of opioids per patient (0.9 MME). Although opioid prescriptions are adjusted individually and daily, an inadequacy of pain relief is an essential concern. In the group for whom opioids were prescribed, the dose ranged from 5 MME to as high as 120 MME (mean: 30 MME). In view of the pain score before discharge (0.5; range 0 to 7), this amount of opioid may represent the optimal value to achieve effective pain control in patients who are in need of opioids.

A small proportion of patients (2.2%) received

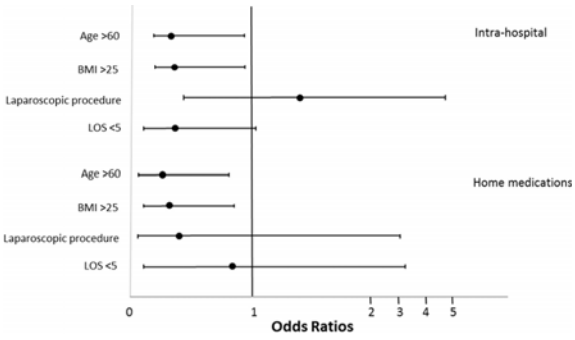

Figure 1. Multiple logistic regression model of post-operative opioid prescriptions during the hospital stay and at discharge.

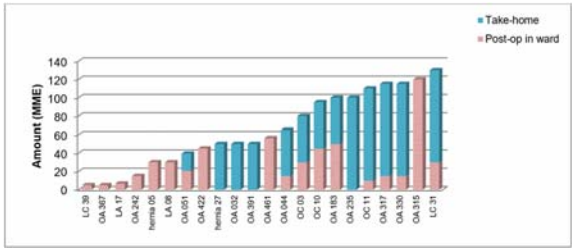

Figure 2. Amount of opioids prescribed, both within the hospital and as a take-home medication.

morphine derivatives as a home medication, and a very small amount of opioids was dispensed at hospital discharge (1.5 MME). There has been recent evidence of an increase in the over-prescription of postoperative opioids. In 2018, Thiels et al[8] reported that 91.2% of patients who had undergone common elective surgery received opioids at discharge, while telephone interviews reported that more than half of the total opioid pills that had been dispensed were never used by the patients. In detail, only 43 MME (range: 0 to 184 MME) of the total of 225 MME that had been provided for home use had been consumed. The amounts of morphine utilized for specific procedures were also reported by Thiels et al, e.g., more than 100 MME were taken home after LCs and open hernia repairs.

In a comparison of the same kinds of operation, Hanson et al[9] published details of the usage of postoperative opioids in 492 cases of emergency LC. Most patients (93.7%) were provided with opioid derivatives as their home medication, with the median amount of opioids dispensed being 225 MME (150 to 300), the last pain score before discharge being 2 (1 to 4), and the median LOS being 1 day (1 to 2). Although it seems like a large amount of morphine was utilized, the average LOS was very short compared with the current study's median of 5.1 days (2 to 16). In fact, acute pain after operations spontaneously decreases day by day. Both early discharge and the effect of vague opioid practices may lead to the excessive prescribing of opioids. In

present study, the prescribing physicians were able to tailor the opioid levels properly for their patients during the admission period, given that the median LOS was 5.1 days. In addition, the physicians' resulting familiarity with the individual patients' pain levels facilitated the precise ordering of the patients' home analgesic levels.

Trying to anticipate the need for opioids is difficult due to many factors and the individual experience. If opioids are prescribed accurately, adverse consequences will decline. Data from the present study's multiple logistic regression found that opioids were statistically significantly prescribed to the younger and leaner patients both during admission and before discharge. The diminished pain perception of elderly patients and the lower levels of pain aggravation experienced by obese patients explain their reduced postoperative opioid requirements.

Conclusion

After undergoing five common emergency operations, only a trivial proportion received oral morphine derivatives as intrahospital analgesics and take-home medications. Based on case-by-case tailoring, postoperative pain scores need to be observed daily. The analyzed data revealed that the proportions of morphine prescribed were higher for the younger age group and for patients with a BMI less than 25. Such data could be gathered inter-institutionally to establish common practice guidelines for predicting the need for opioids postoperatively.

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What is already known on this topic?

No previous data.

What this study adds?

1) The doses and timings of the postoperative opioid usages after common urgency operations.

2) Two groups of patient that need more postoperative opioids.

Potential conflicts of interest

The authors declare no conflict of interest.

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แนวทางระดับนานาชาติว่าด้วยการสั่งจ่ายยาอนุพันธ์มอร์ฟีนภายหลังการผ่าตัดศัลยศาสตร์ทั่วไปที่พบได้บ่อย

ณภคดล นพคุณสมบูรณ์, จิรวัฒน์ สว่างศรี, ยงยุทธ ศิริวัฒนอักษร, นภาพร กองแก้วไพศาล

วัตถุประสงค์: ปัจจุบันยังไม่มีแนวทางสำหรับการใช้อนุพันธ์มอร์ฟีนเป็นยาแก้ปวดหลังผ่าตัด ทำให้มีการศึกษาหาปริมาณที่เหมาะสมในการใช้ยาเพื่อลดภาวะแทรกซ้อนของมอร์ฟีนอย่างกว้างขวางทั่วโลก ในการศึกษานี้รายงานสัดส่วนของผู้ป่วยที่ได้รับและปริมาณของอนุพันธ์มอร์ฟีนที่ใช้หลังการผ่าตัดช่องท้องฉุกเฉินที่พบบ่อยจากหน่วยงานศัลยศาสตร์ฉุกเฉิน

วัสดุและวิธีการ: ข้อมูลอนุพันธ์มอร์ฟีนที่ถูกสั่งให้ผู้ป่วยในรูปแบบกินสำหรับผู้ป่วยหลังผ่าตัดฉุกเฉินถูกเก็บย้อนหลัง โดยเวชระเบียนอิเล็กทรอนิกส์ของผู้ป่วยทั้งหมดที่เข้ารับการผ่าตัดไส้ติ่งแบบเปิด การผ่าตัดไส้ติ่งแบบส่องกล้อง การผ่าตัดถุงน้ำดีแบบส่องกล้อง การผ่าตัดถุงน้ำดีแบบเปิดและการผ่าตัดไส้เลื่อนแบบเปิด อัตราการสั่งโดยแพทย์และปริมาณอนุพันธ์มอร์ฟีนช่วงหลังผ่าตัดถูกรายงานทั้งช่วงอยู่ในโรงพยาบาลและตอนกลับบ้าน ปริมาณของอนุพันธ์มอร์ฟีนจากยาแต่ละชนิด ถูกแปลงและรายงานในหน่วย morphine milligram equivalents (MME)

ผลการศึกษา: อนุพันธ์มอร์ฟีนถูกสั่งให้ผู้ป่วยหลังผ่าตัดทั้งหมด 22 ราย (3.8%) โดยรวมมีค่าเฉลี่ย 2.4 MME โดย 18 ราย (3.1%) ได้รับอนุพันธ์มอร์ฟีนช่วงอยู่ในโรงพยาบาลแต่ละรายที่ได้รับมอร์ฟีนในกลุ่มนี้เฉลี่ย 30 MME มีผู้ป่วย 13 ราย (2.2%) ได้รับมอร์ฟีนเป็นยากลับบ้าน ซึ่งมีค่าเฉลี่ย 67 MME ผู้ป่วยทั้งหมดมีค่าเฉลี่ยการอยู่โรงพยาบาล 3.2 วัน (1 ถึง 33) และมีค่าเฉลี่ยคะแนนความปวดก่อนกลับบ้านอยู่ที่ 0.5 (0 ถึง 7) จากการวิเคราะห์ทางสถิติ multiple logistic regression พบว่าผู้ป่วยที่มีอายุน้อยกว่าหรือเท่ากับ 60 ปี และผู้ป่วยที่มีดัชนีมวลกายน้อยกว่า 25 มีสัดส่วนที่ถูกจ่ายอนุพันธ์มอร์ฟีนมากกว่าอย่างมีนัยสำคัญ

สรุป: ผู้ป่วยส่วนมากไม่ต้องใช้อนุพันธ์มอร์ฟีนในการลดความเจ็บปวดหลังเข้ารับการผ่าตัดภาวะฉุกเฉินในช่องท้อง โดยปริมาณของอนุพันธ์มอร์ฟีนเล็กน้อยถูกจ่ายให้ผู้ป่วยแต่ละรายทั้งช่วงอยู่ในโรงพยาบาลและตอนกลับบ้าน อนุพันธ์มอร์ฟีนมักถูกจ่ายให้กลุ่มผู้ป่วยที่มีอายุน้อยและดัชนีมวลกายต่ำ